SETOBATES (ACARIDA: CRYPTOSTIGMATA: SCHELORIBATIDAE) FROM SOUTH AUSTRALIAN SOILS

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Summary

LEE, D. C. & PAJAK, G. A. (1988) *Setobates* (Acarida: Cryptostigmata: Scheloribatidae) from South Australian soils. *Trans. R. Soc. S. Aust.* 112(1), 21-27, 31 May 1988.

Setobates Balogh, 1962 is rediagnosed and compared with other genera in the Scheloribatidae. Two species are described as new: *S. ultraforaminosus*, *S. coronopubes*. They are from soil and litter from the arid, semi-arid and mallee-heath sites, but not the other six South Australian sites in the Mediterranean-type region. This is the first record of *Setobates* from Australia. Hysteronotal chaetotaxy is discussed. Five species are newly combined with *Setobates*.

KEY WORDS: *Setobates ultraforaminosus* sp. nov., *S. coronopubes* sp. nov., Acarida, chaetotaxy, soils, South Australia.

Introduction

This publication is part of an ongoing study of sarcoptiform mites in South Australian soils, sampled from nine florally diverse sites, and for which there is an introduction to the relevant work on the advanced oribate mites (Planofissurae) (Lee 1987). A paper on the family to which *Setobates* belongs, Scheloribatidae, and its nominotype, includes relevant further comments on methods (Lee & Pajak *in press*). Measurements are in microns (μm).

No new notational systems are introduced here, but the hysteronotal chaetotaxy is commented on to indicate how a commitment to certain homologies was reached, which in turn requires a new signature for one seta. The mites studied have been deposited in the South Australian Museum.

Hysteronotal Chaetotaxy

It is assumed that the primitive complement of hysteronotal setae amongst Cryptostigmata is 16 pairs (6*J*, 6*Z*, 4*S*) (Lee 1987) and that the general trend is towards loss of setal pairs (regressive synapomorphies) in the adults. On the other hand, primitive members of the Planofissurae, the Phereneotae, have fewer pairs (with *J*4 absent except amongst Hermanniellidae) than some members of the advanced Poronotae (including *Setobates* with *J*4 present), indicating that if the Phereneotae are a paraphyletic group that is ancestral to the remaining Planofissurae, then the relevant synapomorphies are not always regressive. The tritonymphs of the Poronotae and adults of the included *Constrictobates* (see Lee 1987, Fig. 3) have 15 pairs of hysteronotal setae, lacking *S*2, and this is assumed to be the primitive full complement for the Poronotae, although *Neotrichozetes* is hypertrichous with 35 pairs of hysteronotal setae. Amongst Oripodoidea most genera have ten pairs of hysteronotal setae and some as few as seven pairs, whilst *Setobates* has amongst the more extensive chaetotaxies with up to 14 pairs where the second absent pair is considered to be *J*1. After transformation, this is the only disagreement with previous homologies. The closely allied *Topobates* with 14 pairs, for example, being regarded as having present 'c1' and 'c2' and not 'c3' (Grandjean 1958, Fig. 3A) or, transformed to the notation used here, *S*1 is absent and *J*1 is present. Deciding the hysteronotal setae that are lost in some members of *Setobates*, regarded here as including species with as few as 11 pairs, as well as from other genera such as the closely allied *Scheloribates*, is difficult. The setal chaetotaxy of tritonymphs is conservative and too drastically changed in many adults to be useful in establishing homologies, whilst the relative position of adult setae to other structures such as pores probably varies between taxa within the Oripodoidea. Here, the option of trying to maximise the similarity between taxa is taken so that position variations are regarded as translocations of setae. As a result, *Scheloribates* is regarded as having a hysteronotal chaetotaxy of 2*J*, 6*Z*, 2*S*, requiring a modification of the initial interpretation of the 10-pair system (Lee 1987, Fig. 2), seta *'li'* being *Z*3 not *J*3, so that it is homologous to *'lm'* in the 15-pair system (Lee 1987, Fig. 1). This is as previously given by Balogh (1972, Fig. 5), and when the common ten pairs of hysteronotal setae of oripodoid species are treated as a reduced 15-pair system (*la* etc.) as for *Cryptozetes* (Norton & Palacios-Vargas 1987, Fig. 1A) rather than the 10-pair system (*la* etc.) previously used (e.g. as for *Hemileius* by Grandjean 1953, Fig. 1A). Also, in this study, the chaetotaxy of *Anoplozetes* (see Lee & Pajak 1987, Fig. 1) should be changed, so that what was represented as *J*3 should be regarded as

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*Z*3, the formula becoming 2*J*, 6*Z*, 2*S*, seta *Z*3 being transposed into the *J*3 position relative to the slit-like pore *hf*3.

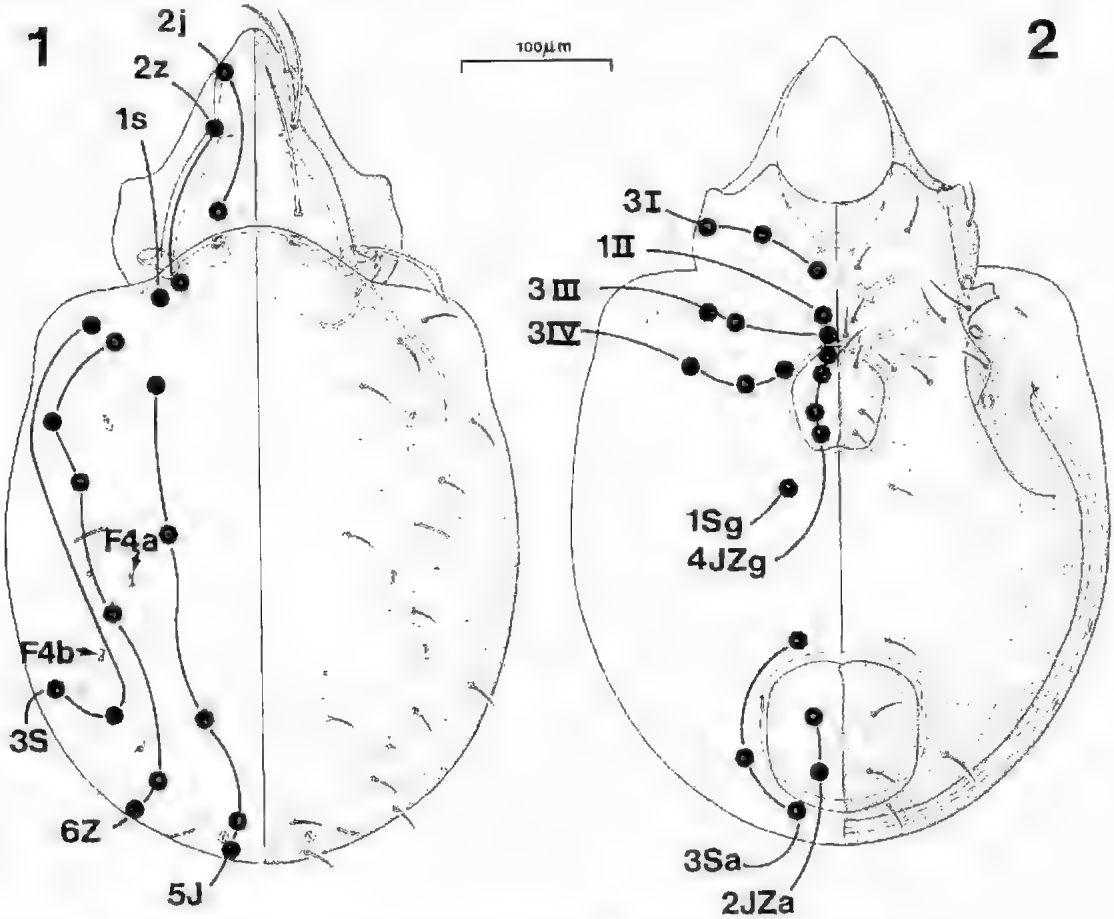
Setobates Balogh, 1962

Setobates Balogh, 1962, p. 122 (type-species by original designation: "*Setobates magnus* sp. n."); Coetzer 1968, p. 91; Luxton 1985, p. 68.

Type-species: Setobates magnus Balogh, 1962.

Diagnosis: Scheloribatidae. Hysteronotum with 11–14 pairs (2–5*J*, 6*Z*, 2–3*S*) of setae and four or five pairs of normal (not fissuriform) sacculate foramina. Proteronotal sensory seta (*z*2) usually lanceolate, rarely capitate or fusiform, not setiform. No translamella or complete interlamella line (setae *z*1–*z*1), prelamella (setae *z*1–*j*1) sometimes present. Pteromorph present, either short or long, anterior margin merging with dorsosejugal furrow without dorsally obscuring aperture to bothridium (base of seta *z*2). Hysteronotal surface without tubercles, granulations or conspicuous longitudinal striae. Four pairs of genital setae (*JZg*). Discidium present. Tarsus I with three proximoventral setae (*av*1, *pv*1, *v*2). Trochanter IV semisquare in vertical outline, distodorsal surface right-angulate. Pretarsus with three claws.

Morphology of Australian Species: Somal length range: 328–586. Somal chaetotaxy: 2*j*, 2*z*, 1*s*; 5*J*, 6*Z*, 2–3*S*; 3*I*, *1II*, *3III*, *3IV*; 4*JZg*, 1*Sg*, 2*JZa*, 3*Sa*. All setae of normal length, no microsetae. Bothridium base without posterior flange. Proteronotal setae *j*2–*j*2 well separated (distance greater than *j*1–*z*1). Two pairs of unnamed hysteronotal circular pores (anterior pair between seta *Z*2 and pore of *F*3; posterior pair just anterior to seta *J*4), only posterior pair illustrated (Figs 1 and 4), anterior pair indistinct. Hysteronotum with 5 pairs of large slit-shaped pores, dorsally placed *hf*3 and *hf*6 larger, *hf*1, *hf*4, *hf*5 apparent from ventral aspect, *hf*2 not located. Multituberculate cerotegument lying between leg bases and



Figs. 1–2. *Setobates ultraforaminosus* sp. nov., female. 1, notum of soma; 2, sternum of soma.

pteromorph base plus lamella, terminating level with middle of legs I and IV. Lateral coxite setae (*12*, *13*, *III2*, *III3*, *IV3*) longer than those around midline. Adaxial end of apodeme base III level with seta *JZg2* and seta *IV1*. Discidium triangulate, equilateral. Custodial ridge merging with pedotectum II base and not discidial ridge. Some leg segments always with porose areas and rugae. Legs of medium-length (mean femur-tarsus: 44% of soma) and stout or of medium-girth (mean maximum tibial height: 35–43% of mean length). Femur II with seta *v* between 0.5–0.75 × flange depth towards periphery. Tibia I dorsal surface sloping upwards from base to solenidium. Tibia II with proximoventral spur. Tarsi I and II gradually tapering distally for more than half their length (subtriangulate). Pretarsi with lateral claws much slimmer.

Distribution: Probably cosmopolitan, but records only from Argentina and Bolivia (NTe), Tanzania (Ee), Europe (Pe, Pm); New Zealand (An) and now known from Australia (Aa). The South Australian material is from three dry sites (with encompassing mean annual rainfalls): Arid tussock grassland (125–150 mm); Semi-arid shrubland (150–200 mm); Mallee-heath, tall open shrubland (450–500 mm). Records from other regions of the world are from a wide range of habitats including mostly moist sites.

Remarks: Setobates is used here to include most species of Scheloribatidae that have more than ten pairs of hysteronotal setae. Other genera in this category are *Topobates* Grandjean, 1958 with 14 pairs of hysteronotal setae but a granulated hysteronotum, *Samoabates* Hammer, 1973 with 14 pairs of hysteronotal setae but only one pretarsal claw and *Striatobates* Hammer, 1973 with 11 pairs of hysteronotal setae and a striated tuberculate hysteronotum. The following 13 species are grouped in *Setobates*: *S. alvaradoi* (Pérez-Iñigo, 1968) comb. nov. ex *Scheloribates*; *S. campestris* (Mihelčič, 1966) comb. nov. ex *Scheloribates*; *S. coronopubes* sp. nov.; *S. labyrinthicus* (Jeleva, 1962 in Csiszar & Jeleva 1962) comb. nov. ex *Scheloribates*; *S. latipes* (Koch, 1841; Shaldybina, 1975) comb. nov. ex *Scheloribates*; *S. longior* (Hammer, 1958); *S. magnus* Balogh, 1962 (type-species); *S. medius* Hammer, 1967 (syn. *S. discors* Hammer, 1967); *S. pallidus* (Mihelčič, 1956) comb. nov. ex *Scheloribates*; *S. parvialatus* (Hammer, 1958); *S. scheloribatoides* (Ramsay, 1966) (syn. *S. minor* Hammer, 1967); *S. ultraforaminosus* sp. nov., *S. umbraili* (Schweizer, 1956). *Setobates* is very similar to *Scheloribates*. For some species, the greater number of hysteronotal setae is the only substantial difference from species of the *euselosus*-complex (*Scheloribates*) and the delineation of the two genera as presented here is provisional. *S. labyrinthicus* in particular, with only a spine-like seta *S1* extra to the ten pairs of *Scheloribates*, may well have to be returned to that genus.

Setobates ultraforaminosus sp. nov.
FIGS 1–3

Female: Idiosomal length, 561 (semi-arid shrubland, 6, 515–586), 531 (arid tussock grassland, 2, 527–535). Leg lengths (femur-tarsus for 560, semi-arid shrubland): I–263, II–239, III–211, IV–262. Tibial maximum heights (for 560, semi-arid shrubland): I–27, II–22, III–18, IV–19.

Proteronotum with complete prelamella (seta *j1*–*z1*) accompanied by dark sclerotization in integument. Sublamella distinct from lamella along nearly entire length. Interlamella seta (*j2*) able to reach to about level of base of rostral seta (*j1*). Sensory seta (*z2*) long, able to reach to beyond level of seta *j2*, exposed stalk more than half length, caput lanceolate with one dorsal and one ventral cilia pair, in dorsal aspect at times appearing parallel-sided and nearly setose with cilia not evident. Seta *s2* length about ×3 diameter of bothridium. Hysteronotum with 14 (*5J*, *6Z*, *3S*) pairs of medium-sized setae present, seta *S1* present on all specimens. Five pairs of foramina (*F3*, *F4a*, *F4b*, *F5*, *F6*) with narrow slit-shaped pore and duct leading to small globular sac.

Narrow gap between apodemes I, slightly less than distance between setae *f1*–*f1*. Circumpedal ridge long and curved, merging with discidial ridge. Seta *Sa2* substantially longer (about ×1.5) than *Sa3*. Egg subellipsoidal, exochorion mainly granulate, at poles rugose, 213 × 125 (for 560, semiarid shrubland) and 210 × 118 (for 527, arid tussock grassland). Females examined (6) from semi-arid shrubland with four eggs each. Females examined (2) from arid tussock grassland had either no eggs or eight eggs.

Legs of medium-girth (mean maximum tibial height: 35% of mean length). Small ventral flange on femur I. Femur III with ventral flange running entire length of segment. Tibia I with posterior proximoventral ridge obscuring outline of proximoventral spur. Tarsi longer (+ 2 to 9 μm) than their respective tibia.

Male: Similar to female but shorter mean length. Idiosomal length, 496 (semi-arid shrubland, 3, 481–511), 504 (arid tussock grassland, 5, 473–560).

Material examined: Holotype female (N1987715), five paratype females (N1987716–N1987720), three

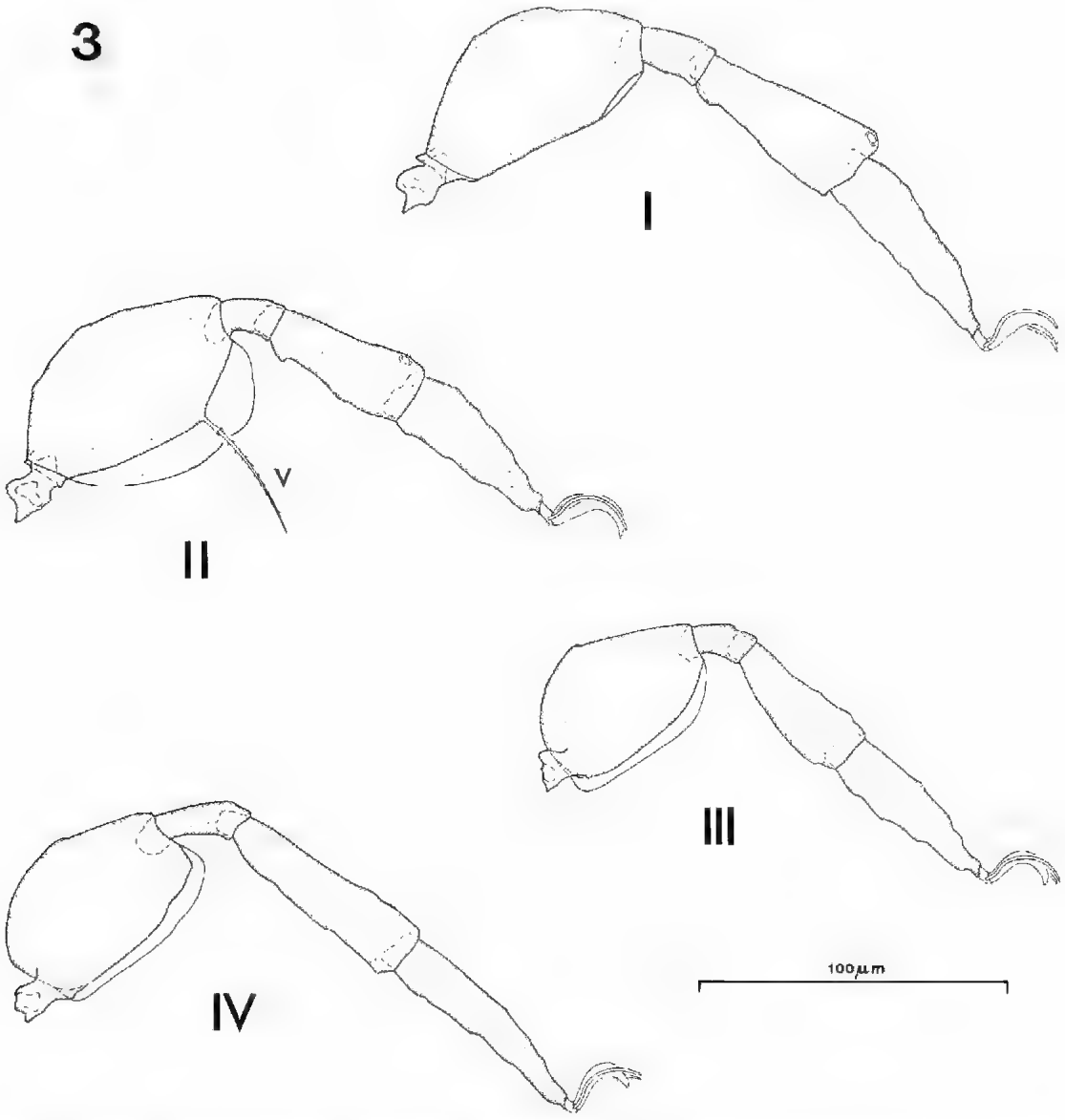


Fig. 3. *Setobates ultraforaminosus* sp. nov., female, posterior aspect of part (femur-pretarsus) of right legs, only one seta (*v* femur II) illustrated.

paratype males (N1987721—N1987723), soil, litter, moss and other low growth plants under bladder saltbush (*Atriplex vesicaria*) amongst sparse false sandlewood (*Myoporum platycarpum*), Koonamore Vegetation Reserve (32°07'S, 139°21'E), 27.vi.1974, D. C. Lee. Two undesignated females (N1987724, N1987725), third female lost, five undesignated males (N1987726 –N1987730), bases of love grass (*Eragrostis eriopoda*) tussocks, near Emu (28°41'S, 132°08'E), 11.x.1974, D. C. Lee.

Distribution: Australia (Aa). South Australia. Lake Frome Basin, semi-arid shrubland, six females and three males in 4 of 8 × 25 cm^2 samples. Great Victoria Desert, arid tussock grassland, three females and five males in 4 of 8 × 25 cm^2 samples.

Remarks: S. ultraforaminosus is very similar to *S. alvaradoi* from Spain, having 14 pairs of hysteronotal setae and five pairs of foramina (*F4* divided into *F4a* and *F4b*). *S. alvaradoi* differs in

that sensory seta *z*2 is rounded distally, hysteronotal seta *Z*1 is less than half the length of *S*1 and that on femur II the ventral flange is not very big. It is likely, on the basis of adult form, that *S. ultraforaminosus* occurs at the two sites listed, but, because the number of eggs per female in the small series from near Emu is eight, rather than uniformly four as in the large series from Koonamore, it has been excluded from the type series.

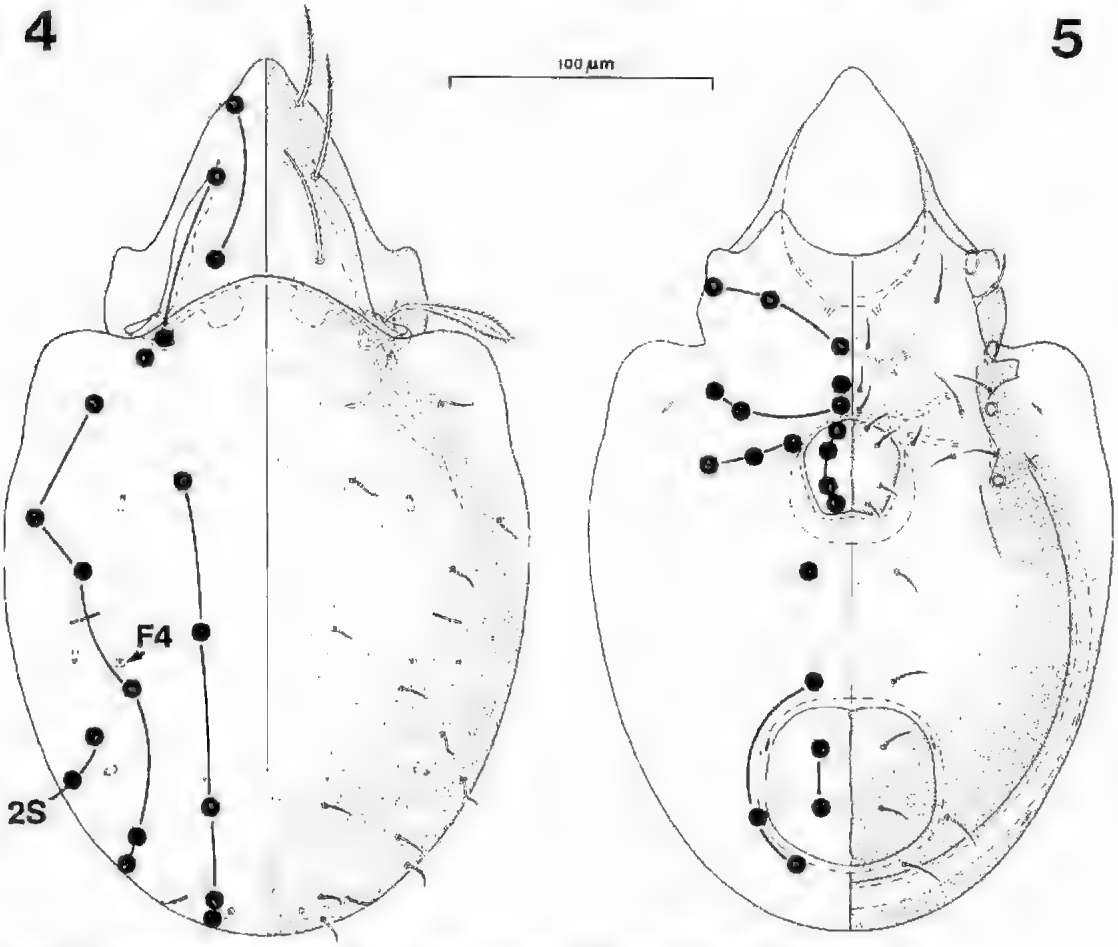
Setobates coronopubes sp. nov.
FIGS 4–6

Male (female not known): Idiosomal length, 331 (2, 328 and 334). Leg lengths (femur-tarsus for 328): I–159; II–146; III–127; IV–150. Tibial maximum heights (for 328): I–20; II–17; III–15; IV–13.

Proteronotum with prelamella restricted to short ridge near seta *z*1. Sublamella distinct from lamella along nearly entire length. Interlamella seta (*j*2) unable to reach level of base of rostral seta (*j*1). Sensory seta (*z*2) long, able to reach beyond level of seta *j*2, exposed stalk less than half length, caput lanceolate, indistinctly delineated from stalk, with three cilia files. Seta *s*2 length about ×2 diameter of bothridium. Hysteronotum with 13 pairs of medium-sized setae, seta *S*1 absent. Four pairs of foramina (*F*3, *F*4, *F*5, *F*6) with circular pore leading to small globular sac.

Moderate gap between apodemes I, more than distance between seta *I*1–*I*1. Zone of integument around lateral and posterior margin of genital orifice denser with concentric subsurface striations, forming "halo" with transmitted light for which boundaries indicated by broken line in illustration (Fig. 5). Circumpedal ridge short and straight, not merging with discidial ridge. Seta *Sa*2 subequal in length to *Sa*3.

Legs stout (mean maximum tibial height: 43% of mean length). No ventral flange on femur I. Femur III with ventral flange restricted to distal two-thirds of segment. Tibia I without



Figs. 4–5. *Setobates coronopubes* sp. nov., male. 4, notum of soma; 5, sternum of soma.

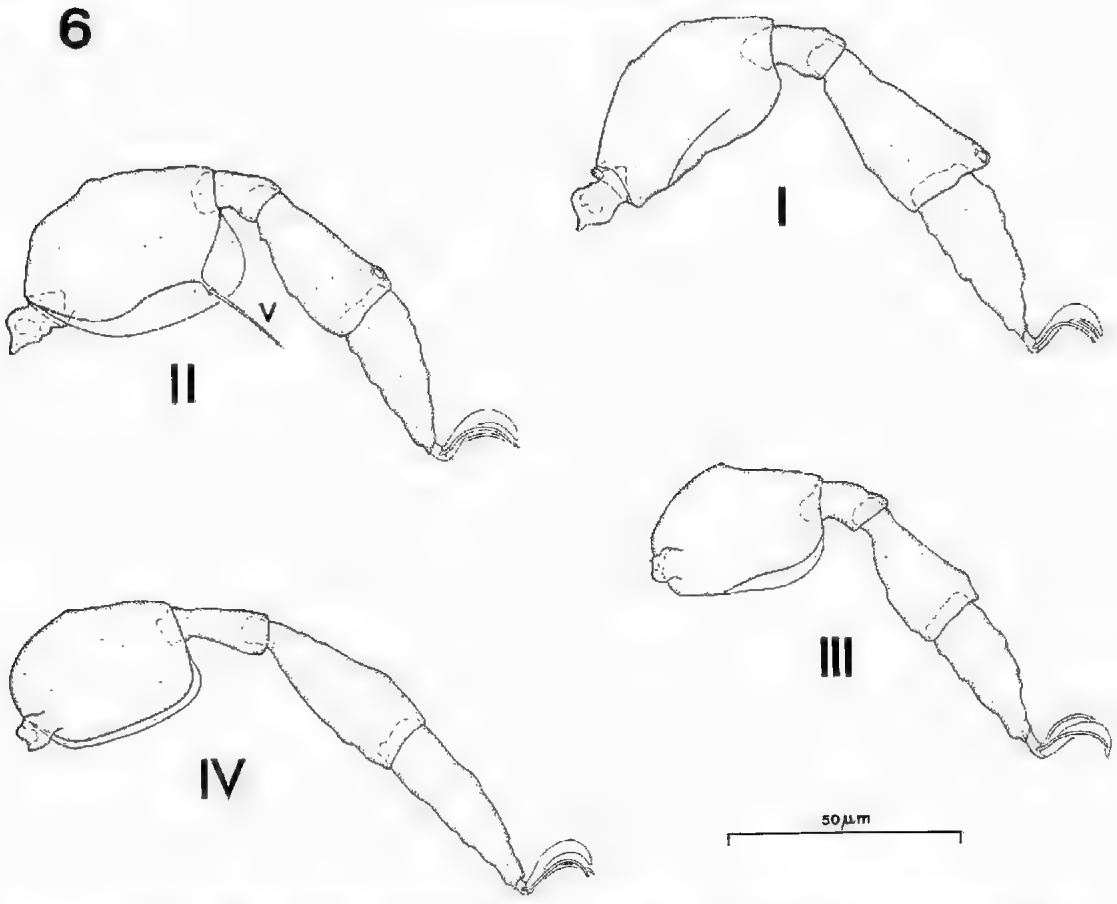


Fig. 6. *Setobates coronopubes* sp. nov., male, posterior aspect of part (femur-pretarsus) of right legs, only one seta (*v*, femur II) illustrated.

proximoventral spur, but girth increases conspicuously from stalk to caput. Tarsi subequal to length to their respective tibia (−2 to +2 μm).

Material examined: Holotype male (N1987731), paratype male (N1987732), soil, litter under banksia shrubs (*Banksia ornata*) amongst other sclerophyllous shrubs and sparse brown stringybark mallee (*Eucalyptus baxteri*), Tamboore Homestead (35°57'S, 140°29'E), 4.vii.1974, D. C. Lee.

Distribution: Australia (Aa). South Australia. Ninety Mile Desert (nutritional desert), mallee-heath, tall open shrubland, two males in 2 of 8 × 25 cm^2 samples.

Remarks: S. coronopubes, known only by the male, has a generically unique "halo" around the posterior margin of the genital orifice. The hysteronotal chaetotaxy is as for five other species of *Setobates*, including the type-species, but besides the characteristic genital "halo" it is about 100 μm shorter than any other species of *Setobates*.

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